USER'S GUIDE

MODEL: HD115

PART NO. : CS11-304

Hipotronics inc.

applied high voltage technology for industry utilities & science

MP MASTER
MA28423

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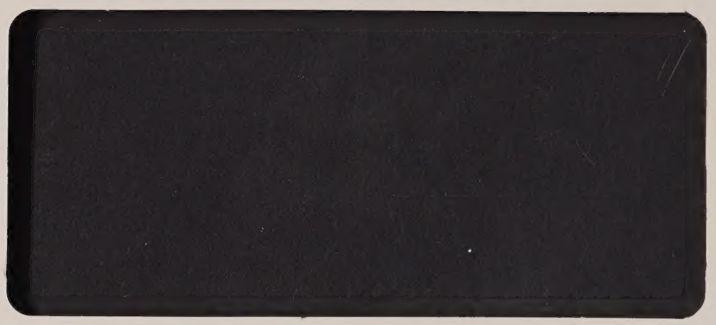

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DANGER HIGH VOLTAGE

WARNING: This publication describes a product engineered and designed to supply HIGH VOLTAGE. Accordingly, maximum safeguards have been built into the equipment and the best safety techniques possible are set forth in the unit's operating instructions. These instructions contain cautions, warning the user to exercise great care in the use of certain controls and at appropriate points in the operating procedures. Despite these written warnings the operator of this equipment is nevertheless strongly advised to maintain a safety consciousness at all times. The following rules are particularly relevant and must be followed at all times.

BEFORE CONNECTING INPUT POWER, GROUND CASE.

BEFORE UNGROUNDING CASE, DISCONNECT POWER.

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SCOPE

This publication describes the HIPOTRONICS' HD100 Series AC/DC Hipot Testers. It is intended to provide a simplified reference for users of this equipment, and to allow them to make use of its features quickly, safely, and efficiently.

Information in the body of this publication applies to all five models in the HD100 Series. Information pertinent to the specific model purchased is provided in the pocket of the back cover of the publication. This includes a diagram of the control panel, a PCB assembly diagram, a schematic diagram and a Parts List.

The publication contains four major sections: General Description, Installation Instructions, Operation Instructions and Special Operations.

The General Description section describes the major features of the models in the HD100 Series, and also contains a description of the functions performed by each of the controls and indicators on the control panel.

The Installation Instructions section provides step-by-step instructions for the installation or set-up of the HD100 Series Hipot Testers.

The Operation Instructions section describes the procedures involved in Overload Adjustment, Meter Recalibration and Trouble Shooting.

GENERAL DESCRIPTION

This section is intended to acquaint the user with the major features of the models in the HIPOTRONICS HD100 Series, and the functions performed by each of the controls and indicators on the control panel.

FEATURES AND SPECIFICATIONS

Test sets in the HIPOTRONICS' HD100 Series perform two major functions:

1. AC Hipot Testing
2. DC Hipot Testing

Hipot testing is the process of testing the dielectric strength of the insulation and measuring the amount of leakage current through the insulation in a test sample at a chosen voltage.

The HD100 Series consists of five models - HD103, HD106, HD115, HD125, HD140 - based on output voltage range.

SPECIFICATIONS

MODEL	OUTPUT VOLTAGE (KV) AC	OUTPUT VOLTAGE (KV) DC	OUTPUT CURRENT METER DC	OUTPUT CURRENT METER AC	KV METER RANGES
HD103	2.5	3.0	0-50/500/5000 µA	0-5 mA	0-0.6/1.2/3 kV
HD106	5.0	6.0	0-50/500/5000 µA	0-5 mA	0-1.2/3/6 kV
HD115	12.0	15.0	0-50/500/5000 µA	0-5 mA	0-3.75/7.5/15 kV
HD125	10.0	25.0	0-50/500/5000 µA	0-5 mA	0-5/10/25 kV
HD140	15.0	40.0	0-50/500/5000 µA	0-5 mA	0-8/20/40 kV

All models operate from an input of 115 volts, 50/60 Hz, 3 amp; rated output current is 5 mA. Each model has a three-range kilovoltmeter and a four-range current meter. (Refer to above table for specific ranges.) Standard features include an input power switch and fuse, indicator lights, High Voltage ON/OFF pushbuttons, zero start and external interlock, adjustable voltage control, visual and audible overload indications with reset pushbutton and front panel test lead connections.

All units are constructed with a standard 19" panel, and enclosed in an attractive bench-top cabinet. Included with each unit is a ground lead and a shielded test lead. A HV test probe may also be included as an optional extra.

CONTROLS AND INDICATORS

VOLTMETER AND RANGE SELECTOR

The kilovoltmeter is located to the left of the control panel and is labled "AC/DC KILOVOLTS" on the scale. The KV Meter has a triple-range selector switch directly below it. Each range corresponds to a different set of numbers on the scale. The LOW range corresponds to the bottom row of numbers, the MED range to the middle row and the HIGH range to the top row.

The user is cautioned to keep the RAISE VOLTAGE control set on "0" when not in use, and to lower the control back to zero immediately upon completion of a test.

CURRENT METER AND RANGE SELECTOR

The Current Meter is located on the right side of the control panel and is labeled "AC MILLIAMPERES/DC MICROAMPERES on the scale. Directly below the Current Meter is a four-range selector switch; one AC range and three DC ranges. When the range slector is in the AC position, readings will be obtained from the numbers in "RED" on the scale. When the range selector is in any one of the three dc positions, readings will be obtained by multiplying the scale reading (numbers in "BLACK") by the appropriate range selector factor (See Table below). The current range switch also determines AC or DC mode of operation.

SETTING	VALUE
X1	1
X10	10
$X10^2$	100

FIGURE 2 VALUE EQUIVALENTS OF RANGE SETTINGS

EXAMPLE: In performing a DC Hipot test, the Current Meter is "4" on the DC µA scale, with the Current Range Selector set at "X1K". The proper reading is 4 x 1000 or 4000 µA.

AC/DC MODE OF OPERATION

Either AC or DC modes of operation may be selected via the Current Range Selector switch. Visual indication of output mode is provided over the AC/DC output jacks. Mode selection only establishes appropriate metering circuitry (AC or DC). It should be emphasized that both AC and DC output jacks are energized when high voltage is initiated; this is regardless of operation mode. The user is therefore cautioned to avoid contact with unused jack.

AC POWER CONTROLS

The AC Power section of the control panel contains an ON/OFF toggle switch, a pilot light and a 5 amp fuse. The unit has ac power when the toggle switch is up and the pilot light glows. The 5 amp fuse protects the input and may be accessed for replacement by pressing the black cap down while turning it counterclockwise.

OVERLOAD

IMPORTANT CAUTION: ALL MODELS SHOULD BE WARMED UP FOR ONE MINUTE BEFORE USING. THIS ENSURES THAT THE 2D21 TUBE IN THE OVERLOAD CIRCUIT IS OPERATING IN ITS STEADY STATE CONDITION.

The three OVERLOAD controls -- FAILURE, RESET AND SENS -- are used during hipot testing. The red FAILURE indicator lights up when leakage current from the test sample exceeds the overload (SENS) setting. The red RESET button must be pressed following a failure, to turn off indicators and to permit further testing. The SENS control provides the means for adjusting the overload from 50 µA (MAX sensitivity) to 5.5 mA (MIN sensitivity). In ac mode, maximum usable sensitivity is approximately 300 µa due to unavoidable capacitive current flow in the output cable.

HIGH VOLTAGE CONTROLS

The High Voltage Controls consist of ON/OFF pushbuttons, a pilot light and a Raise Voltage control. HV can be energized by positioning the voltage control to "zero" (zero start interlock) and depressing the HV ON pushbutton. HV is energized when the pilot light lights. If the HV OFF pushbutton is depressed or the test is terminated by some other means (e.g., overload circuit trips) the pilot light goes out and HV is deenergized.

FUNCTION INDICATORS

The function indicators, located above the output jacks on each side of the control panel, denote whether ac output or dc output is being metered. On all models, the glow of the indicator light is dependent on the setting of the output switch.

EXTERNAL INTERLOCK

This provision is provided for operator safety and is used with an external switch (eg. switch mounted on test cage door). The switch contacts must be closed in order to energize HV.

OUTPUT JACKS

On each side of the control panel is an output jack, through which the output voltage is applied. The AC OUT jack is used when performing ac hipot testing the DC OUT jack when performing dc hipot testing or resistance measurement. When unit is operating, both jacks are energized regardless of the test being performed. The user is therefore cautioned to avoid contact with the unused jack when unit is ON.

GROUND POSTS

Ground Posts are the brass posts located on each side of the control panel. They are used to complete the circuit when testing, and as a safety ground.

INSTALLATION INSTRUCTIONS

This section provides step-by-step instructions for the installation or set-up of the HD100 Series Hipot Testers.

1. Select a location for the unit that will place the meters at eye level to allow for maximum accuracy in readings.

2. Set RAISE VOLTAGE control to zero, and check to ensure that AC Power switch is in OFF (down) position.

3. Ground case before connecting input power. A GROUND Post on the control panel may be used for this purpose.

4. Plug line cord of unit into 115 volt, 50/60 Hz outlet. If a two-prong adapter is used, be sure to ground the pigtail.

5. Turn AC POWER switch ON (up position). Allow one minute warm-up time for both standard and deluxe models.

OPERATION INSTRUCTIONS

This section provides step-by-step instructions for performing the two major test functions: AC Hipot Testing, DC Hipot Testing. Prior to performing any of these functions, the procedures described in the preceding section, "INSTALLATION INSTRUCTIONS", must be performed.

DC Hipot Testing

1. For DC operation, set the current ranging switch to the appropriate dc current range (x1, x10 or $x10^2$).

2. Ensure that the unit is properly grounded and the RAISE VOLTAGE control is set to zero.

3. Connect low side of test sample to a GROUND Post. (Ground lead supplied with the unit may be used for this purpose.)

4. Connect the alligator clip of the shielded HV test lead to high side of test sample.

5. Set OVERLOAD to desired sensitivity. (See OVERLOAD Adjustment, p. 10.)

6. To ensure that only leakage current from the test sample is recorded on the current meter, any other potential sources of leakage in or near the test sample should be removed.

7. Press the HV ON button.

8. Increase output voltage to desired level via RAISE VOLTAGE control.

9. Maintain output voltage at desired level for required amount of test time. Note reading on the current meter.

10. When test is complete, reduce RAISE VOLTAGE control back to zero, and await return of the voltmeter reading to zero. Press HV OFF button.

11. If the test sample breaks down, overload will trip FAILURE signal, in which case RESET button must be pressed.

12. After RAISE VOLTAGE control is reduced to zero, connect ground to HV lead to protect the operator from shock.

13. To resume testing, check to ensure that voltmeter reads zero, disconnect leads from test sample and begin again at Step 3.

AC HIPOT TESTING

1. For ac operation, set current range switch to the ac position.

2. Ensure that the unit is properly grounded and that the RAISE VOLTAGE control is set at zero.

3. Connect low side of test sample to a GROUND Post. (Ground lead supplied with the unit may be used for this purpose.)

4. Connect alligator clip of shielded test lead to the high side of the test sample.

5. Set OVERLOAD to desired sensitivity. (See OVERLOAD Adjustment, p. 10.)

6. To ensure that only leakage current from the test sample is recorded on the current meter, any other potential sources of leakage in or near the test sample should be removed.

7. Press the HV ON button.

8. Increase the output voltage to desired level via RAISE VOLTAGE control.

9. Maintain output voltage to desired level for required amount of test time. Note reading on Current Meter.

10. When test is complete, reduce RAISE VOLTAGE control back to zero and await return of the voltmeter reading to zero. Press HV OFF button.

11. If the test sample breaks down, overload will trip FAILURE signal, in which case RESET button must be pressed.

12. After RAISE VOLTAGE control is reduced to zero, connect ground to HV lead to protect operator from shock.

13. To resume testing, check to ensure that voltmeter reads zero; disconnect leads from test sample and begin again at Step 3.

SPECIAL OPERATIONS

This section describes the step-by-step procedures required to perform special operations incidental to the three major functions described in the preceding section. These special operations are Overload Adjustment, Meter Recalibration and Trouble Shooting.

OVERLOAD ADJUSTMENT

IMPORTANT CAUTION: ALL MODELS SHOULD BE WARMED UP FOR ONE MINUTE BEFORE USING. THIS ENSURES THAT THE 2D21 TUBE IN THE OVERLOAD CIRCUIT IS OPERATING IN ITS STEADY STATE CONDITION.

In order to perform hipot testing that meets the specific requirements of your operation, the OVERLOAD point (the amount of leakage current that will cause the FAILURE signal to be tripped) must be properly adjusted.

The HD100 Series Hipot Testers will test for leakage current at any desired point between approximately 50 µA (maximum sensitivity) to approximately 5.5 mA (minimum sensitivity), depending on the SENS control setting.

If ac testing is being done, do not set the SENS control to "MAX", as leakage current in most test samples will exceed 50 µA and constantly trip the FAILURE signal.

The OVERLOAD may be set to the desired value as follows:

1. Ensure that the unit is properly grounded and that RAISE VOLTAGE control is set at zero.

2. Set OUTPUT control to appropriate MICROAMPS range setting.

3. Connect low side of test sample to a GROUND post. (Ground lead supplied with unit may be used for this purpose.)

4. Connect alligator clip of shielded HV test lead to high side of test sample.

5. Press HV "ON" button.

6. Raise output voltage via RAISE VOLTAGE control until desired value of trip current is indicated on current meter.

7. Turn SENS control slowly towards "MAX" until the FAILURE signal trips.

8. Reduce RAISE VOLTAGE control to zero, and press RESET button.

9. Verify accuracy of OVERLOAD setting by repeating Step 7, noting the reading on the Current Meter when the FAILURE signal trips.

10. If Current Meter reading matches value of desired trip current leakage, reduce RAISE VOLTAGE control to zero, press RESET button, disconnect resistive load and resume AC or DC Hipot Testing at Step 5 as described in "Operating Instructions" section.

    If Current Meter reading does not match value of desired trip current leakage, reduce RAISE VOLTAGE control to zero, press RESET button, and begin again at Step 6.

VOLTMETER CALIBRATION - DC

1. Ensure that unit is properly grounded and that RAISE VOLTAGE control is set to zero.

2. The CURRENT RANGE switch should be set to the DC X1 range and VOLTAGE RANGE switch set to LOW.

3. Select calibrated external voltmeter with meter range appropriate for unit to be calibrated.

4. Connect low side (ground) of external voltmeter to GROUND Post of unit.

5. Connect alligator clip of shielded test lead to high side of external voltmeter.

6. Increase output voltage via RAISE VOLTAGE control until external voltmeter reading is equivalent to two-thirds of LOW kilovolt scale of meter to be calibrated (unit meter).

7. Check reading on unit meter.

8. Adjust unit meter as necessary via calibration pot labeled "DC" on printed circuit board (see diagram), until unit meter reading equals reading on external meter. Use long, insulated screwdriver when calibrating to avoid contact with High Voltage leads. (High Voltage leads are connected to large transformer in rear of unit.)

9. Switch VOLTAGE RANGE control from MED to HIGH and check unit meter to ensure that these scale readings are accurate. If unit meter reading at HIGH setting is not accurate, replace R8 resistor. Replace R7 resistor if MED setting is inaccurate.

10. Reduce RAISE VOLTAGE control to zero.

VOLTMETER CALIBRATION - AC

1. Ensure that unit is properly grounded, and that RAISE VOLTAGE control is set to zero.

2. The CURRENT RANGE switch control should be set to the AC range and VOLTAGE RANGE switch set to LOW.

3. Select calibrated external voltmeter with meter range appropriate for unit to be calibrated.

4. Connect low side (ground) of external voltmeter to GROUND Post of unit.

5. Connect alligator clip of shielded test lead to high side of external voltmeter.

6. Increase output voltage via RAISE VOLTAGE control until external voltmeter reading is equivalent to two-thirds of LOW kilovolt scale of meter to be calibrated (unit meter).

7. Check reading on unit meter

8. Adjust unit meter as necessary via calibration pot labeled "AC" on printed circuit board (see diagram), until unit meter reading equals reading on external meter. Use long, insulated screwdriver when calibrating to avoid contact with High Voltage leads. (High Voltage leads are connected to large transformer in rear of unit).

9. Switch VOLTAGE RANGE control from MED to HIGH and check unit meter to ensure that these scale reading are accurate. If unit meter reading at HIGH setting is not accurate, replace R8 resistor. Replace R7 resistor if MED set is inaccurate.

10. Reduce RAISE VOLTAGE control to zero.

CURRENT METER CALIBRATION

Current meters in the HD100 Series can only be calibrated in the 5 mA ac range.

AC CUR CALIBRATION

1. Ensure that the unit is properly grounded and that the RAISE VOLTAGE control is set to zero.

2. Set CURRENT RANGE switch to "AC".

3. Select 250 k ohms, 25 W resistive load and an external current meter with a 0-5 mA ac range.

4. Connect the low side of the external current meter to the unit GROUND Post and the high side to one end of the resistive load.

5. Connect the other side of the resistive load to the ac output voltage.

6. Increase RAISE VOLTAGE control until external current meter reading is 4 mA.

7. Adjust the unit meter as necessary to indicate 4 mA. Adjust via calibration pot labeled "AC CUR".

8. Reduce RAISE VOLTAGE control to zero.

9. Disconnect shielded test lead from AC OUT Bushing. Disconnect leads from resistive load, current meter and unit GROUND Post.

TROUBLE-SHOOTING

All products shipped by HIPOTRONICS are thoroughly tested against a rigid set of standards by the firm's Quality Control Department. In the event a unit appears not to function upon delivery, the user is referred to the section, "RETURNED MATERIAL".

This section of the publication is intended to aid the user in locating the source of a problem when a unit is either not functioning or functioning improperly.

Use of these procedures is at the user's own risk. It is not recommended that these procedures be used while the equipment is under Warranty, as some of the recommended steps involve the removal, testing or disconnecting of commponents which could result in voiding the Warranty.

These procedures are intended for use only by a trained repair technician, and are not recommended for use by individuals trained only to operate the equipment, except under strict supervision.

An attempt has been made to provide information to aid the user in trouble-shooting those problems that are most commonly encountered, either as a result of normal wear and tear or direct damage to the unit. Trouble-shooting procedures are described in tabular form on the next two pages, for ease in reference. Procedures are listed according to problem area. Possible causes of each problem are listed, along with appropriate remedial action for each case.

A flow chart summarizing the trouble-shooting process appears on Figure 3. A schematic diagram of the unit, denoting Test Points and associated voltage along with major reference points in the circuit, is contained in the pocket of this publication for reference when trouble-shooting.

TABLE 1 TROUBLE-SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	RECOMMENDED ACTION
NO HIGH VOLTAGE OUTPUT	A. OVERLOAD not reset B. Overload relay contacts not connecting C. Damage to T2 Transformer D. Damage to T1 Variac (RAISE VOLTAGE CONTROL)	A. Press Reset button B. Clean or replace RY1A contacts C&D Check output of component with external voltmeter; replace if necessary
LOW VOLTMETER READINGS	A. Voltmeter out of adjustment B. Low line voltage	A. Recalibrate voltmeter B. Obtain reading at power source and inform responsible authority
ERRATIC HIGH VOLTAGE OUTPUT	A. Variac (RAISE VOLTAGE CONTROL) brushes dirty or worn B. Overload relay contacts not connecting properly C. Fluctuating line voltage	A. Clean or replace Variac brushes B. Clean or replace RY1A contacts C. Obtain reading at power source and inform responsible authority.
AC OUTPUT OK; NO DC OUTPUT	A. Faulty CR1 diode	A. Replace CR1 diode
ERRATIC OUTPUT CURRENT	A. Arcing from R1 Resistor B. Internal arcing in T2 Transformer	A. Replace R1 Resistor B. Check output current from T2 Transformer; replace if not constant
OVERLOAD DOES NOT TRIP	A. Bad 2D21 tube B. Failure in power supply C. SENS resistor value too low	A. Replace 2D21 tube B. Check voltage at transformer (A1 2D21 Board) C. Replace SENS Resistor(R4 A1 Board)
OVERLOAD TRIPS TOO SOON	A. SENS control set improperly B. High Voltage load more than 5 mA C. SENS resistor value too high	A. Perform OVERLOAD Adjustment as described earlier in this publication B. Limit high voltage load to maximum of 5 mA. C. Replace SENS resistor (R4 A1 2D21 Board)
RAISING VOLTAGE BLOWS FUSE (NO LOAD)	A. Damage to T1 Variac B. Faulty component in HIGH VOLTAGE section	A. Check Variac and brushes for burn marks; replace if damaged B. Disconnect input to C1 Capacitor and raise voltage. If fuse does not blow, check and replace faulty C1 Capacitor or CR1 diode.

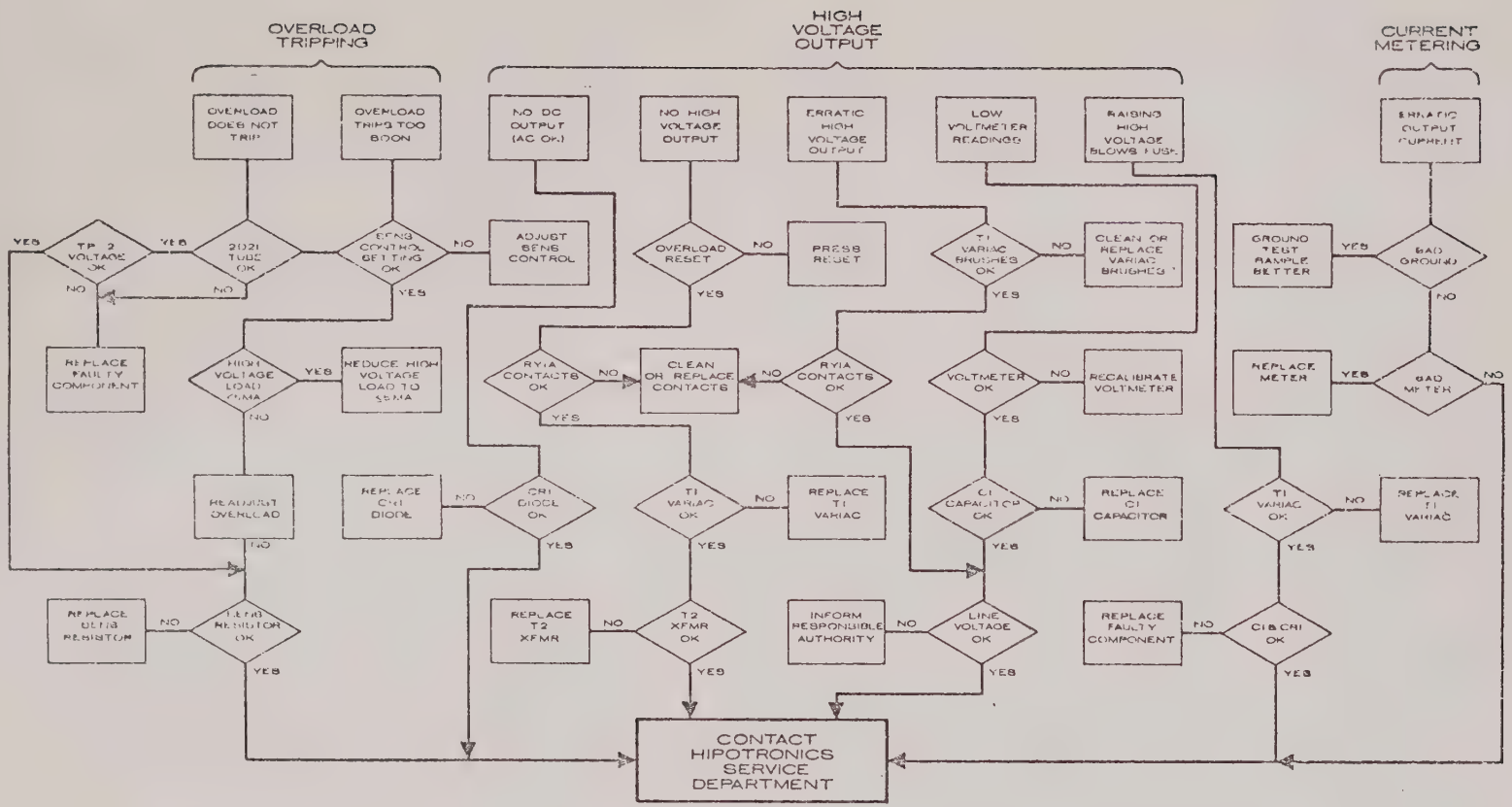

Figure 3 TROUBLE SHOOTING FLOWCHART FOR HD100 SERIES HIPOT TESTERS

RETURNED MATERIAL

If, for any reason, it should become necessary to return the equipment described in this publication to the factory, the Warranty Service Department of Hipotronics must be contacted, at which time the following data must be given in order that we may identify the unit and determine the necessity for return. (Tel. (914) 279-8091) MODEL, SERIAL NO. and TYPE (Part No) is indicated on the black and silver tag affixed to the unit.

MODEL:
SERIAL NUMBER:
TYPE (Part No):
REASON FOR RETURN:
DEFECT:
ALLEGED CAUSE OF DEFECT:

If Hipotronics deems return of the unit appropriate, an "Authorization for Return" tag will be issued. This will instruct you as to the method of return. The pink copy is for your records, the hard copy to be affixed to the unit being returned. If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this point without the proper authorization shall be held as "customer's property," with no service performed until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service. Thank you.

PARTS ORDERING

To order replacement parts of this unit, please refer to the Parts List contained in the pocket of this publication. The number of the specific component is required, along with the TYPE (Part No) of the unit. The TYPE (Part No) is indicated on your Parts List, and on the black and silver tag affixed to the unit.

Exhibit A
SOP#652

WARRANTY

HIPOTRONICS, INC. warrants to the orginal purchaser of any new merchandise that the merchandise is free from defects in material and workmanship under normal use and service for a period of one year from the date of shipment. The obligation of HIPOTRONICS, INC. under this Warranty is limited, in its exclusive option, to repair, replace or issue credit for parts or materials which prove to be defective, and is subject to Purchaser's compliance with the HIPOTRONICS, INC. Warranty Claim Procedure as set forth below. The happening of any one or more of the following events will serve to void this Warranty and any defect or damage resulting therefrom is specifically excluded for Warranty coverage: (a) defects due to accident, negligence, alteration, modification, faulty installation by Purchaser or Purchaser's agents or employee, abuse or misuse; (b) attempted or actual dismantling, disassembling, service or repair by any person, firm or corporation not specifically authorized in writing by HIPOTRONICS, INC. (c) defects caused by or due to handling by carrier, or incurred during shipment, transshipment or other move.

This Warranty covers only those parts and/or materials deemed by HIPOTRONICS, INC. to be defective within the meaning of this Warranty. The liability of HIPOTRONICS, INC. shall be limited to the repair, replacement or issuance of credit for parts deemed defective within the meaning of this Warranty. Costs incurred by purchaser for labor or other expenses incidental to the inspection, repair, replacement or issuance of credit for such parts and/or material shall be the sole responsibility of purchaser. This Warranty shall not apply to any accessories, parts, or materials not manufactured or supplied by HIPOTRONICS, INC. and if, in the sole discretion of HIPOTRONICS, INC., Purchaser's claim relates to any materials or workmanship manufactured or performed by the supplier of a component part, or of the manufacturer of a device of which the defective part is a component, HIPOTRONICS, INC. reserves the right to disclaim liability under this Warranty and to direct that the Purchaser deal directly with such supplier or manufacturer. HIPOTRONICS, INC. agrees to assist the Purchaser in processing or settling any such claim without prejudicing its position as to liability.

WARRANTY CLAIM PROCEDURE

Compliance with the following Warranty claim Procedure is a condition precedent to the obligation of HIPOTRONICS, INC. under this Warranty:

a) Purchaser must notify HIPOTRONICS, INC. in writing by certified or registered mail, of the defect claimed within twelve months after date of original shipment. Said notice shall describe in detail the defect, the defective part, and the alleged cause of defect.

b) At the exclusive option of HIPOTRONICS, INC., Purchaser shall dismantle or disassemble at Purchaser's cost and expense and shall ship the defective part or material prepaid to HIPOTRONICS, INC., Brewster, New York 10509, for inspection, or permit an authorized service representative of HIPOTRONICS, INC. to inspect the defective part or material at Purchaser's premises. If HIPOTRONICS, INC. shall inspect the part or material at the Purchaser's premises, Purchaser shall provide facilities for, and at Purchaser's cost and expense, dismantle, disassemble, or otherwise make accessible the subject part or material whether or not same is a component of or installed in a device other than that manufactured or supplied by HIPOTRONICS, INC. If disclosure shows that the defect is not one for which HIPOTRONICS, INC. is liable, the Purchaser agrees to reimburse HIPOTRONICS, INC. for all expense incurred.

c) Upon receipt of the defective part or material, or after access to same, HIPOTRONICS, INC. shall inspect the part or material to determine the validity of Purchaser's claim.

The validity of any Warranty Claim, Purchaser's compliance with HIPOTRONICS, INC. Warranty Claim Procedure, the obligation to either repair, replace, or issue credit, or direct the purchaser to deal directly with a manufacturer or supplier are to be determined solely and exclusively by HIPOTRONICS, INC. and any determination so made shall be final and binding.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED ON THE PART OF HIPOTRONICS, INC., INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE, AND CONSEQUENTIAL DAMAGES ARISING FROM ANY BREACH THEREOF AND HIPOTRONICS, INC. NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME ANY LIABILITY OR OBLIGATION IN CONNECTION WITH THIS SALE ON ITS BEHALF AND PURCHASER ACKNOWLEDGES THAT NO REPRESENTATIONS EXCEPT THOSE MADE HEREIN HAVE BEEN MADE TO PURCHASER.

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